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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/475,104	12/30/1999	NAGESH VODRAHALLI	042390.P6785	5963

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EXAMINER

COLLINS, DEVEN M

ART UNIT PAPER NUMBER

2823

DATE MAILED: 12/20/2001

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/475,104

Applicant(s)

VODRAHALLI ET AL.

Examiner

D. M. Collins

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 September 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 5-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 5-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

- 15) ☒ Notice of References Cited (PTO-892)
- 16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 17) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 18) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 19) ☐ Notice of Informal Patent Application (PTO-152)
- 20) ☐ Other: _____

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DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 5, 9, 14, 15, 17, and 20 are rejected under 35 U.S.C. 102(b) as being unpatentable over Lauf et al. (5,721,286, dated 2/24/98).

Iwasaki shows the method as claimed in the Figures 1-15 with corresponding text. In re claim 5, Lauf et al. disclose a method for assembling an integrated circuit package 36, comprising: applying an epoxy 11 to an integrated circuit; placing a thermal element adjacent to the epoxy 11; and, curing the epoxy 11 with energy at a microwave frequency 10.

In re claim 9, Lauf et al. disclose a method for assembling an integrated circuit package 36, comprising: applying an epoxy 11 to a thermal element; placing the epoxy 11 and the thermal element onto an integrated circuit 36; and, curing the epoxy 11 with energy at a microwave frequency 10.

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In re claim 14, Lauf et al. disclose the method of claim 5, wherein prior to applying said epoxy 11, the method further comprises providing a thermally conductive filler to a resin 11 to form said epoxy 11.

In re claim 15, Lauf et al. disclose the method of claim 14, wherein said thermally conductive filler includes carbon particles.

In re claim 17, Lauf et al. disclose the method of claim 5, wherein said curing of the epoxy 11 includes selecting the microwave frequency to cure the epoxy 11 without damaging the integrated circuit 36 or heating other components within the integrated circuit package 36; and generating energy at the microwave frequency by a microwave generator 10 directed toward the epoxy 11.

In re claim 20, Lauf et al. disclose the method of claim 9, wherein said curing of the epoxy 11 includes selecting the microwave frequency to cure the epoxy 11 without damaging the integrated circuit 36 or heating other components within the integrated circuit package 36; and generating energy at the microwave frequency by a microwave generator 10 directed toward the epoxy 11.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are

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such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 6-8, 10-13, 16, 18, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lauf et al. (5,721,286, dated 2/24/98) in view of Barrow (6,146,921, dated 11/14/00).

Lauf et al. show as stated above in 35 U.S.C. 102.

However, Lauf et al. do not show solder balls and thermal element.

In re claims 6-8, 10-13, 16, 18, and 19, Barrow shows a cavity mold BGA package 10 with a post mold thermally conductive epoxy 30 attached to a heat sink.

In re claim 6, Barrow discloses the method of claim 5, further comprising the step of mounting the integrated circuit 10 to a substrate 14.

In re claim 7, Barrow discloses the method of claim 6, further comprising the step of attaching a solder ball 10 to the substrate 14.

In re claim 8, Barrow discloses the method of claim 5, further comprising the step of molding an encapsulant 30 onto the substrate 14 and the integrated circuit 10.

In re claim 10, Barrow discloses the method of claim 9, further comprising mounting the integrated circuit 10 to a substrate 14.

In re claim 11, Barrow discloses the method of claim 10, further comprising attaching a solder ball 18 to the substrate 14.

In re claim 12, Barrow discloses the method of claim 9, further comprising molding an encapsulant 30 onto the substrate 14 and the integrated circuit 10.

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In re claim 13, Barrow discloses the method of claim 5, wherein said thermal element 26 is a heat spreader.

In re claim 16, Barrow discloses the method of claim 5, wherein said placing of said thermal element 26 includes attaching said thermal element 26 to said epoxy 30.

In re claim 18, Barrow discloses the method of claim 9, wherein prior to applying said epoxy to the thermal element 26, the method further comprises providing a thermally conductive filler to a resin to form said epoxy 30.

In re claim 19, Barrow discloses the method of claim 10 further comprising baking the substrate 14 before curing the epoxy 30.

Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Lauf et al. in view of Barrow to include solder balls and thermal element in an effort to cure thermal epoxy for flip chip packages without heating the other elements of the package.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Deven M. Collins whose telephone number is (703) 305-7840.

The examiner can normally be reached on Monday-Friday from 6:30 AM to 3:00 PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M. Fahmy, can be reached on (703) 308-4918. The fax phone number for this Group is (703) 305-3432.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956.

DMC

December 4, 2001


CARL WHITEHEAD, JR.
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